

Supplemental File of

treeio: an R package for phylogenetic tree input and output with richly annotated and associated data

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Exporting Tree Data to *jtree* Format

JSON (JavaScript Object Notation) is a lightweight data-interchange format and widely supported in almost all modern programming languages. To make it easy to import tree with data in other programming languages, treeio supports exporting tree with data in jtree format, which is JSON-based and can be easy to parse using any languages that supports JSON.

The following example import a NHX tree and export the tree to jtree file (The file content was printed as we didn't specify the output file):

```
library(treeio)
```

```
Registered S3 method overwritten by 'treeio':
```

```
  method      from  
  root.phylo ape
```

```
nhxfile <- system.file("extdata/NHX", "phyllog.nhx", package="treeio")  
nhx <- read.nhx(nhxfile)  
write.jtree(nhx)
```

```
{  
  "tree": "(((Prayidae_D27SS7@2825365:0.0682841{1},(Kephyes_ovata@2606431:0.0193941{2},Chuniphyes_mul  
  "data": [  
    {  
      "edge_num": 1,  
      "Ev": "S",  
      "S": "58",  
      "ND": 0  
    },  
    {  
      "edge_num": 2,  
      "Ev": "S",  
      "S": "69",  
      "ND": 1  
    },  
    {  
      "edge_num": 3,  
      "Ev": "S",  
      "S": "70",  
      "ND": 2  
    }  
  ]  
}
```

```
},
{
  "edge_num": 4,
  "Ev": "S",
  "S": "31",
  "ND": 9
},
{
  "edge_num": 5,
  "Ev": "S",
  "S": "37",
  "ND": 10
},
{
  "edge_num": 6,
  "Ev": "S",
  "S": "38",
  "ND": 11
},
{
  "edge_num": 7,
  "Ev": "S",
  "S": "61",
  "ND": 13
},
{
  "edge_num": 8,
  "Ev": "S",
  "S": "52",
  "ND": 15
},
{
  "edge_num": 9,
  "Ev": "S",
  "S": "53",
  "ND": 16
},
{
  "edge_num": 10,
  "Ev": "S",
  "S": "54",
  "ND": 17
},
{
  "edge_num": 11,
  "Ev": "S",
  "S": "65",
  "ND": 19
},
{
  "edge_num": 12,
  "Ev": "S",
  "S": "71",
  "ND": 20
}
```

```
},
{
  "edge_num": 13,
  "Ev": "S",
  "S": "64",
  "ND": 22
},
{
  "edge_num": 14,
  "Ev": "S",
  "S": "26",
  "ND": 28
},
{
  "edge_num": 15,
  "Ev": "S",
  "S": "16",
  "ND": 5
},
{
  "edge_num": 16,
  "Ev": "S",
  "S": "15",
  "ND": 6
},
{
  "edge_num": 17,
  "Ev": "S",
  "S": "9",
  "ND": 30
},
{
  "edge_num": 18,
  "Ev": "D",
  "S": "17",
  "ND": 8
},
{
  "edge_num": 19,
  "Ev": "S",
  "S": "36",
  "ND": 4
},
{
  "edge_num": 20,
  "Ev": "S",
  "S": "60",
  "ND": 3
},
{
  "edge_num": 21,
  "Ev": "S",
  "S": "17",
  "ND": 29
}
```

```
},
{
  "edge_num": 22,
  "Ev": "S",
  "S": "19",
  "ND": 27
},
{
  "edge_num": 23,
  "Ev": "D",
  "S": "24",
  "ND": 26
},
{
  "edge_num": 24,
  "Ev": "S",
  "S": "24",
  "ND": 14
},
{
  "edge_num": 25,
  "Ev": "S",
  "S": "33",
  "ND": 12
},
{
  "edge_num": 26,
  "Ev": "S",
  "S": "35",
  "ND": 25
},
{
  "edge_num": 27,
  "Ev": "S",
  "S": "40",
  "ND": 24
},
{
  "edge_num": 28,
  "Ev": "S",
  "S": "45",
  "ND": 18
},
{
  "edge_num": 29,
  "Ev": "S",
  "S": "46",
  "ND": 23
},
{
  "edge_num": 30,
  "Ev": "S",
  "S": "56",
  "ND": 21
}
```

```

    },
    {
      "edge_num": 31,
      "Ev": "S",
      "S": "12",
      "ND": 7
    }
  ],
  "metadata": {"info": "R-package treeio", "data": "Sat Oct 5 19:46:57 2019"}
}

```

The *jtree* format contains three essential components:

1. tree key: A newick tree text with edge number in curly braces.
2. data key: A list of associated data that mapped to particular edge.
3. metadata key: Additional information.

The *jtree* format is based on JSON and can be parsed using JSON parser. For example, we can use R package `jsonlite` to parse the output file and it will return a list of three elements that described above.

```

jtree_file <- tempfile(fileext = '.jtree')
write.jtree(nhx, file = jtree_file)
jsonlite::fromJSON(jtree_file)

```

\$tree

```
[1] "(((Prayidae_D27SS7@2825365:0.0682841{1},(Kephyes_ovata@2606431:0.0193941{2},Chuniphyes_multidentat
```

\$data

	edge_num	Ev	S	ND
1	1	S	58	0
2	2	S	69	1
3	3	S	70	2
4	4	S	31	9
5	5	S	37	10
6	6	S	38	11
7	7	S	61	13
8	8	S	52	15
9	9	S	53	16
10	10	S	54	17
11	11	S	65	19
12	12	S	71	20
13	13	S	64	22
14	14	S	26	28
15	15	S	16	5
16	16	S	15	6
17	17	S	9	30
18	18	D	17	8
19	19	S	36	4
20	20	S	60	3
21	21	S	17	29
22	22	S	19	27
23	23	D	24	26
24	24	S	24	14

```
25      25  S 33 12
26      26  S 35 25
27      27  S 40 24
28      28  S 45 18
29      29  S 46 23
30      30  S 56 21
31      31  S 12  7
```

```
$metadata
$metadata$info
[1] "R-package treeio"
```

```
$metadata$data
[1] "Sat Oct  5 19:46:57 2019"
```

The *jtree* file can be directly imported as a `treedata` object using `read.jtree` provided by `treeio` package.

```
read.jtree(jtree_file)
```

```
## 'treedata' S4 object that stored information of
##  '/tmp/Rtmpnxh0ST/file20e42c475546.jtree'.
##
## ...@ phylo:
## Phylogenetic tree with 16 tips and 15 internal nodes.
##
## Tip labels:
## Prayidae_D27SS7@2825365, Kephyes_ovata@2606431, Chuniphyes_multidentata@1277217, Apolemia_sp_@13539
##
## Rooted; includes branch lengths.
##
## with the following features available:
## 'Ev', 'S', 'ND'.
```

Updated information can be found on <https://yulab-smu.github.io/treedata-book/chapter3.html>.